The thrombotic bus: Are red blood cells agglutinating in injected people because of zeta potential disruption by spike?

Is PEG in the COVID shots aiding and abetting agglutination?

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5 hr ago

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Before I start, I would advise a quick read of two papers.

1. The Role of Zeta Potential in Rh Agglutination [1] and
2. A Deadly Embrace: Hemagglutination Mediated by SARS-CoV-2 Spike Protein at Its 22 N-Glycosylation Sites, Red Blood Cell Surface Sialoglycoproteins, and Antibody [2]

The first paper's findings (albeit in 1973 and in a specific test system) show that zeta potential is not of great importance in increased agglutinability (is this actually a word?) of test cells.

The second paper finds that the SARS-CoV-2 spike protein binds red blood cells to induce clumping. What I want to know is, what would happen if SARS-2 expressed hemagglutinin esterase? Would we see this thrombotic nightmare in certain individuals who've been injected with the COVID-19 products? [3] I got way ahead of myself there.

I've already penned a couple articles (you can read those here and here) about the effects of spike binding RBD-associated CD147 that leads to the demise of red blood cells (RBCs) by hemolysis, so this article is about another thing that can happen when you mix spike with RBCs that doesn't involve binding of receptors, but direct 'adhesion' of spike and RBCs via the RBD and sialic acid, respectively. Again, I got way ahead of myself here.

Background

On RBC agglutination (hemagglutination)

The word agglutination has its origins in the 1540s from the Latin *agglutinationem*, "act of uniting by glue." [4] Heme refers to blood from the Latin *haemo.* [5] Thus hemagglutination is blood gluing basically. The glue, in the case of RBC agglutination, is the antibody, and the electrical environment permitting this agglutination in the first place as shown in Figure 1. [6]

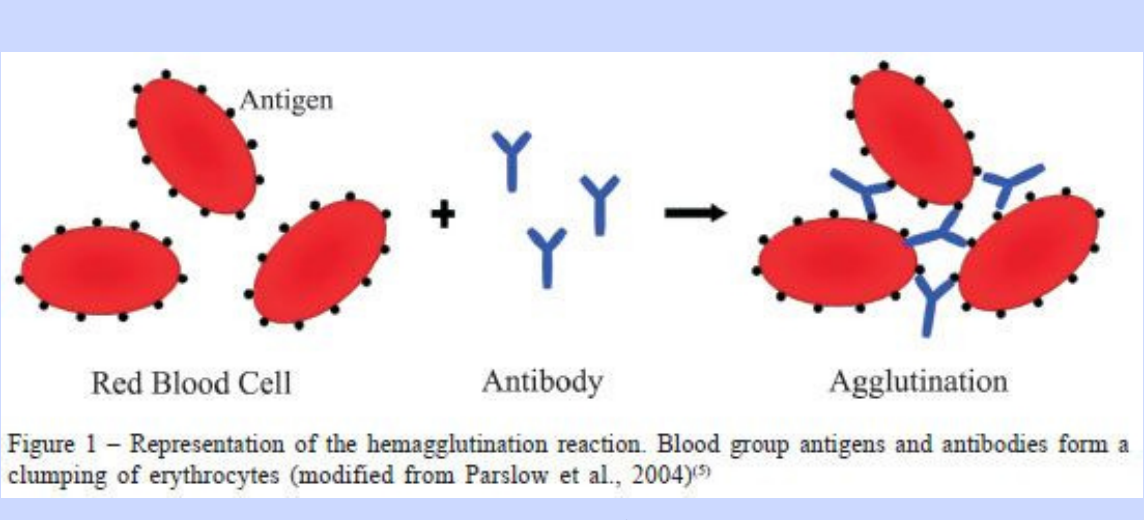


Figure 1 – Representation of the hemagglutination reaction. Blood group antigens and antibodies form a clumping of erythrocytes (modified from Parslow et al., 2004)(5)

Figure 1: Hemagglutination. https://www.scielo.br/j/rbhh/a/pLMNsQRDb5KNcf3P8HxFLcm/?lang=en

In the world of 'disease', these antibodies can be produced when a very unlucky person is exposed to cold temperatures. These particular antibodies are called 'cold agglutinins'. This is a very rare 'disease', by the way. Agglutinins also play a role in some viral infections [7] [8] such as *Epstein-Barr Virus*, in bacterial infections [9] such as *Mycoplasma pneumoniae*, or from lymphoproliferative disorders.

If you've ever wondered why people with different blood types can't share blood randomly, it's because of hemagglutination - antibodies to A type will bind cells with B blood group antigens. You can read a bit about that here.

As a point of interest because we love viruses (speak for yourself Jess), hemagglutinins are proteins on the surfaces of viruses in the *Paramyxoviridae* family that induce hemagglutination. An example of such a virus is the *Influenza* virus. The '*H*' in '*H1N1*' virus, for example, stands for *Hemagglutinin* and the number refers to the type of hemagglutinin. The '*N*' stands for *Neuraminidase* and it helps with the infection process.

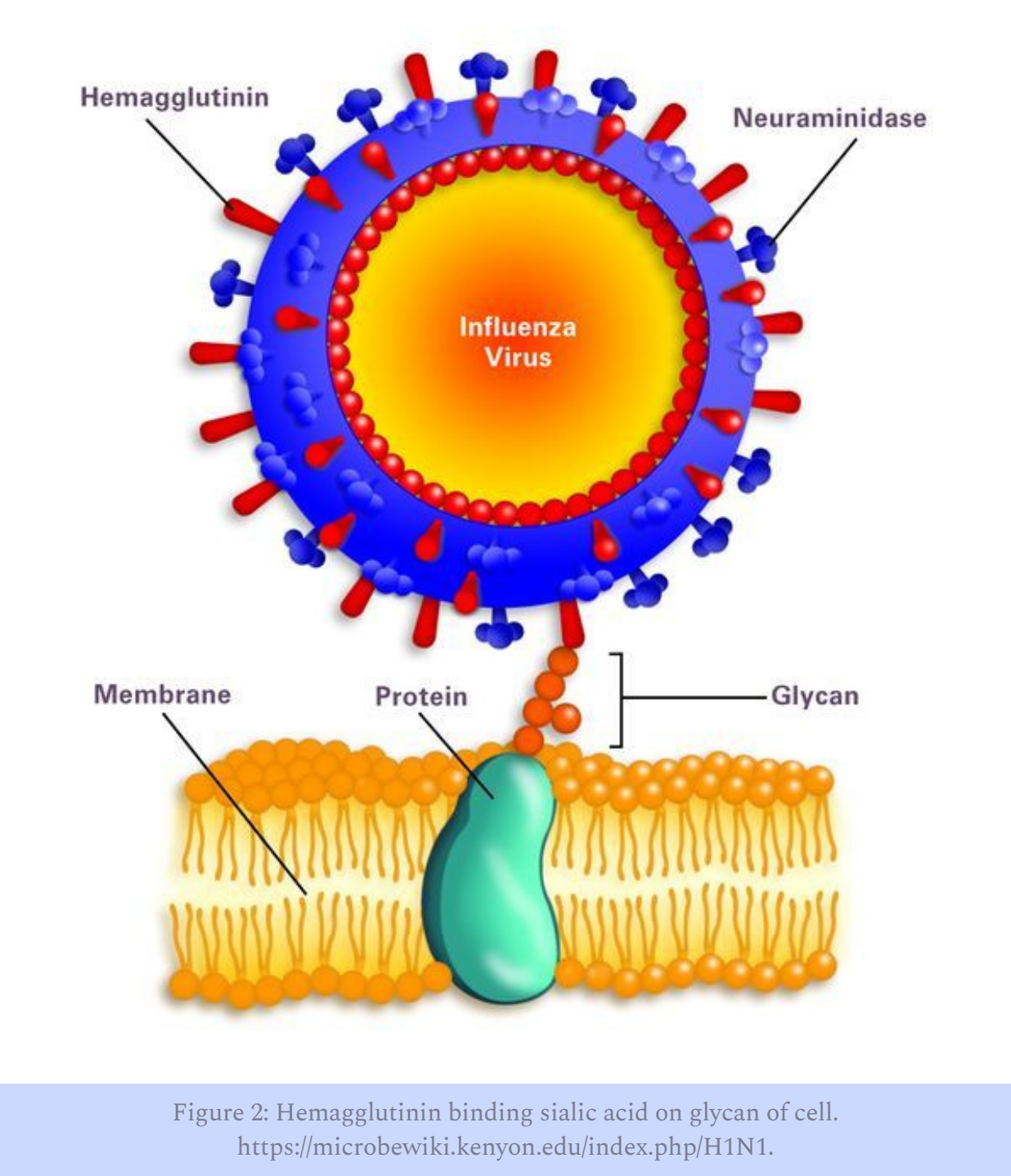


Figure 2: Hemagglutinin binding sialic acid on glycan of cell. https://microbewiki.kenyon.edu/index.php/H1N1.

So, agglutinins, in general, are proteins that induce aggregate formation in the blood.

I know what you're thinking. Does SARS-CoV-2 induce hemagglutination? I will get back to this. [10]

On colloidal mixtures

We can't talk about zeta potential without first understanding what colloids are. Colloids are mixtures: suspensions of insoluble particles dispersed throughout another substance of a different state. When I say 'state', I am referring to either a solid, a liquid or a gas. For example, whipped cream is a gas-liquid colloid and blood is a solid-liquid colloid called a sol. Particles in colloids exhibit Brownian motion which is kind of like when you walk home drunk after a fun night out.

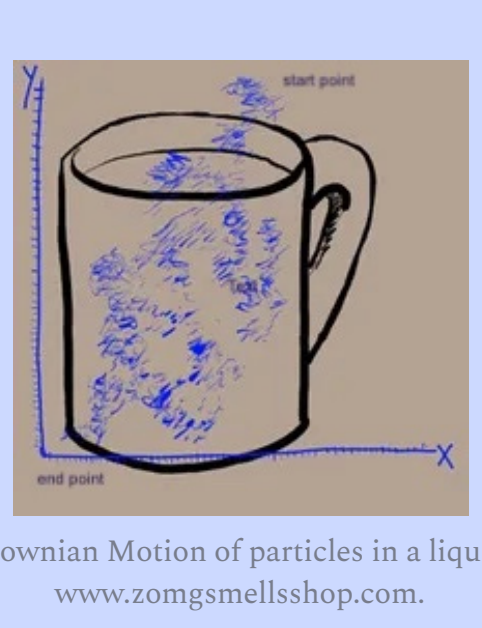
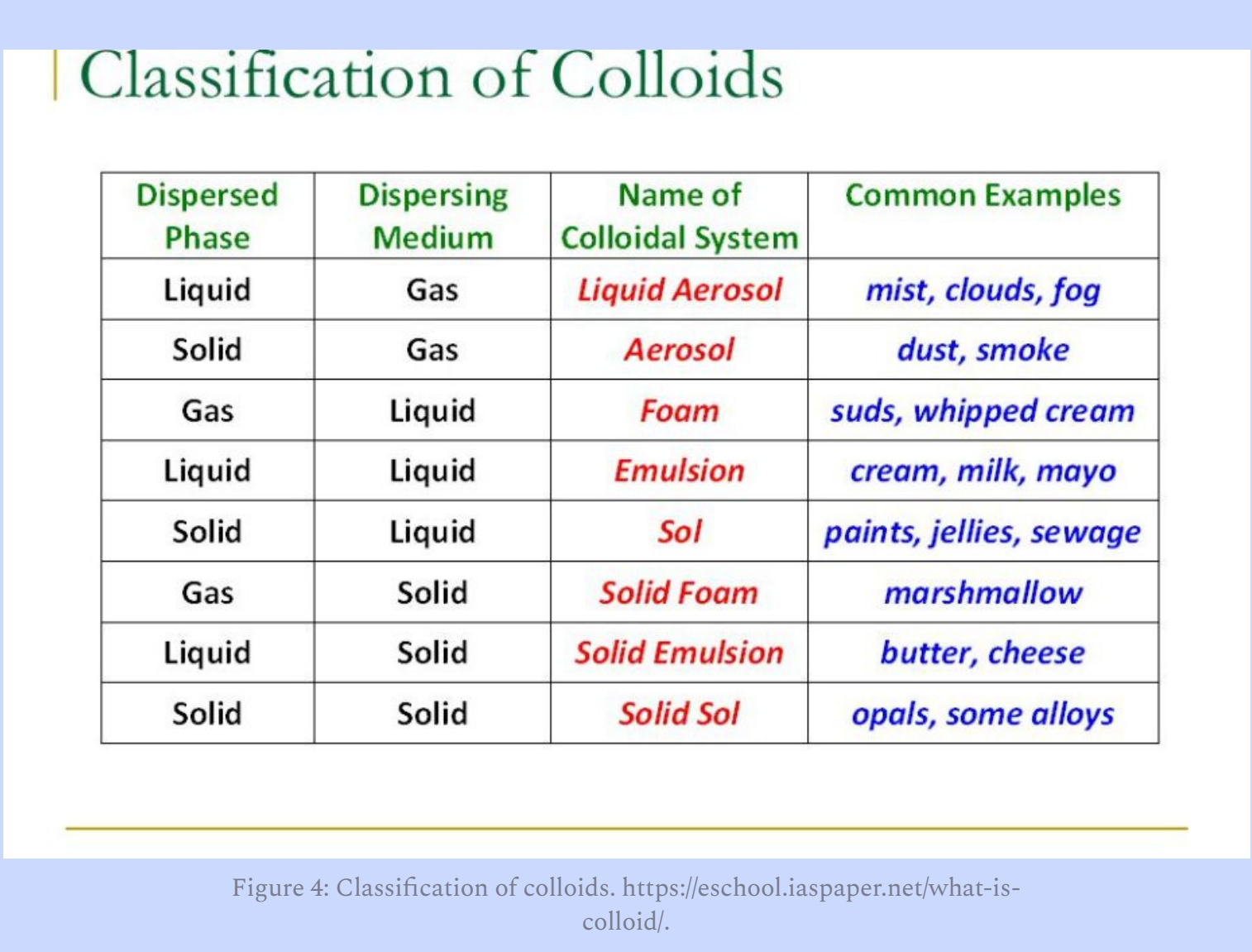


Figure 3: Brownian Motion of particles in a liquid in a mug. www.zomgsmellsshop.com.

Colloids can be mixtures of liquids, solids and gases. Colloids are defined by particle size (1 nm and 1000 nm): they are large enough to scatter light. This is called the Tyndall Effect. Below is a chart that shows various examples of colloids with the respective names. For example, those marshmallows that we all toast on a stick over a campfire are colloids called solid foam. They are actually gases in a solid medium! Colloids can also be unstable (non-homogeneous dispersion of particles) or stable (homogenous dispersion of particles) and this will depend on the zeta potentials of the particles.



Classification of Colloids

Dispersed Phase	Dispersing Medium	Name of Colloidal System	Common Examples
Liquid	Gas	*Liquid Aerosol*	*mist, clouds, fog*
Solid	Gas	*Aerosol*	*dust, smoke*
Gas	Liquid	*Foam*	*suds, whipped cream*
Liquid	Liquid	*Emulsion*	*cream, milk, mayo*
Solid	Liquid	*Sol*	*paints, jellies, sewage*
Gas	Solid	*Solid Foam*	*marshmallow*
Liquid	Solid	*Solid Emulsion*	*butter, cheese*
Solid	Solid	*Solid Sol*	*opals, some alloys*

Figure 4: Classification of colloids. https://eschool.iaspaper.net/what-is-colloid/.

On zeta potential

The reason why colloids are colloids is because of the repulsive forces between particles in a mixture (note: cationic properties of medium if particles are negatively charged). For example, negatively-charged particles in a mixture will repel each other, and this is precisely due to zeta potential. Negatively-charged particles are layered by a tight sphere of positive ions which is called the Stern layer, and another looser sphere of positive and negative ions called the double layer, as shown in figure 5. The boundary between the double layer and the 'outside' of the particle is called the 'Slipping plane' and the zeta potential is the voltage at the edge of the Slipping plane with respect to medium where the particle's surface does not associate with ions, molecules or other things.

It is effectively the physical property exhibited by any colloidal system: the differential between the Stern layer and the double layer that manifests as repulsion. In other words, RBCs don't stick together in the blood because they are all the same charge and they repel each other due to high zeta potential. [11]

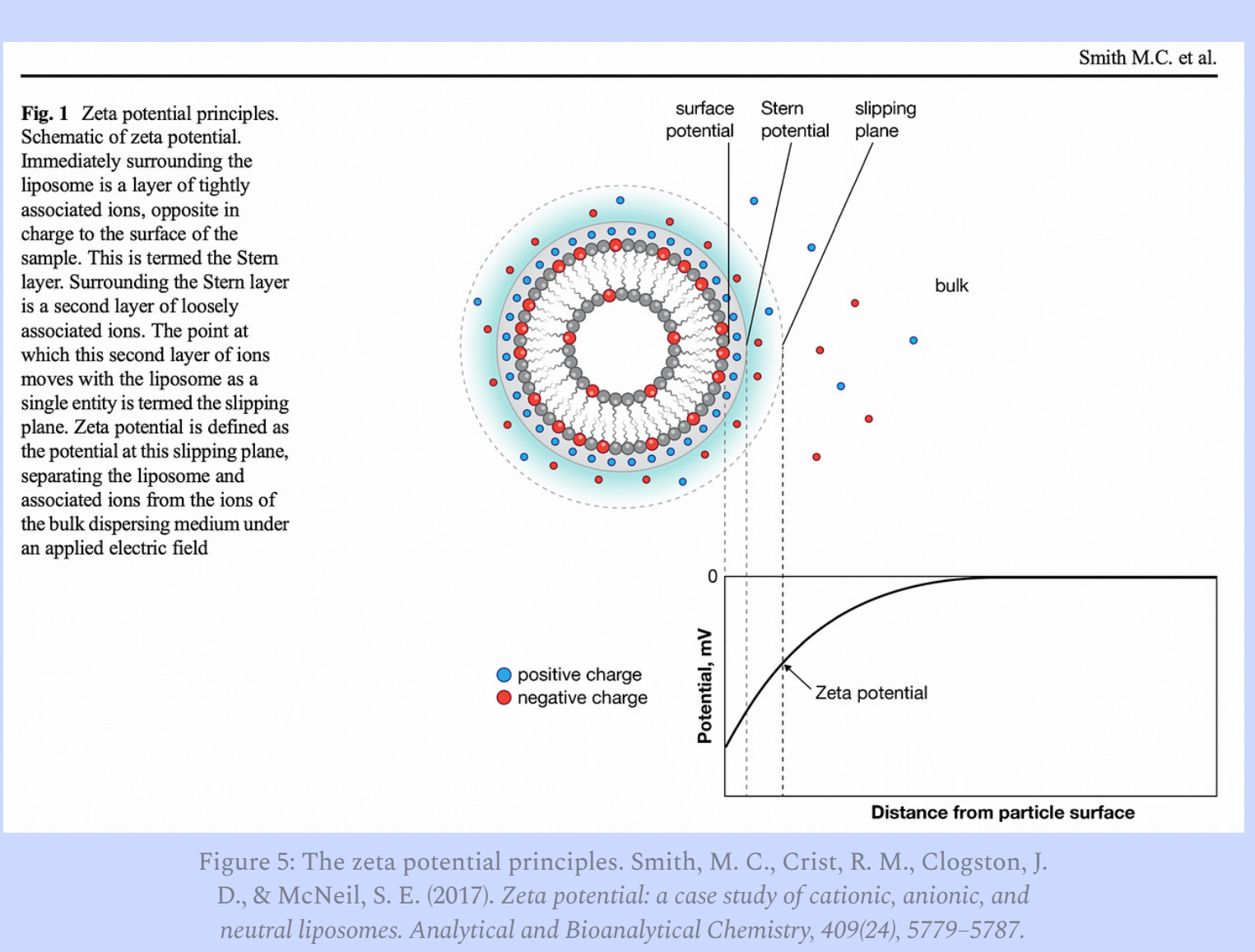


Fig. 1 Zeta potential principles. Schematic of zeta potential. Immediately surrounding the liposome is a layer of tightly associated ions, opposite in charge to the surface of the sample. This is termed the Stern layer. Surrounding the Stern layer is a second layer of loosely associated ions. The point at which this second layer of ions moves with the liposome as a single entity is termed the slipping plane. Zeta potential is defined as the potential at this slipping plane, separating the liposome and associated ions from the ions of the bulk dispersing medium under an applied electric field

Figure 5: The zeta potential principles. Smith, M. C., Crist, R. M., Clogston, J. D., & McNeil, S. E. (2017). *Zeta potential: a case study of cationic, anionic, and neutral liposomes. Analytical and Bioanalytical Chemistry, 409(24), 5779–5787.* doi:10.1007/s00216-017-0527-z.

> If two adjacent particles have sufficiently high zeta potential of the same sign, they will *not agglomerate* due to repulsive electrostatic forces between particles with like charges. [12]

So, if you think about it, if you lower these high zeta potential, the particles likely will agglomerate. What if those particles *are* red blood cells?

On zeta potential of RBCs

> Zeta potential is defined as the degree of negative charge on the surface of a red blood cell; it is the potential difference between the negative charges on the RBCs and the cations in the fluid portion of the blood. [13]

RBCs have a negative charge on their surfaces due to sialic acid. [14] [15] [16] Sialic acids are terminal (at the end), negatively charged monosaccharides (simple sugars) present on many N- and O-glycans (sugar chains). [17] SARS-CoV-2, and all coronaviruses, love sialic acid, by the way, and readily attach to cells with these sialic-tipped glycans via spike protein. (See reference #2) (That might be the most important phrase in this article, and that anyone could write, that I threw in here as a quasi-'side-note'.) Imagine the horror show already: SARS-CoV-2 spike binds RBCs irrespective of ACE-2 or CD147 and clumps them together. Think about it.

> SARS-CoV-2 binds to RBCs in vitro and also in the blood of COVID-19 patients; (2) although ACE2 is its target for viral fusion and replication, SARS-CoV-2 initially attaches to sialic acid (SA) terminal moieties on host cell membranes via glycans on its spike protein… (See reference #2).

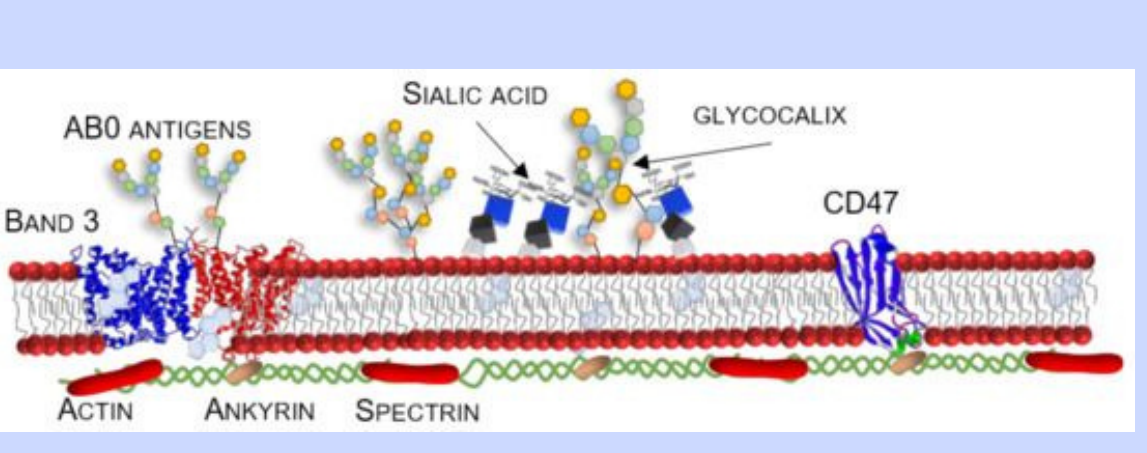


Figure 6: Surface of red blood cell showing position of sialic acid. Della Pelle G, Kostevšek N. Nucleic Acid Delivery with Red-Blood-Cell-Based Carriers. *International Journal of Molecular Sciences.* 2021; 22(10):5264. https://doi.org/10.3390/ijms22105264.

So besides the fact that we already know that SARS-CoV-2 spike binds RBCs and clumps them together, and that therefore, the zeta potentials between the RBCs are 'overcome' (the aggregation force is greater than the force of repulsion), what do we know about other factors that can aid and abet the overcoming of the repulsive forces and the reduction of zeta potentials in the first place?

The zeta potential of RBCs can be affected by pH, ionic strength, osmotic pressure and temperature. [18] Small changes in any of these parameters can potentially have dramatic effects on the zeta potential values. [19] Below is schematic showing the zeta potential of an RBC (erythrocyte).

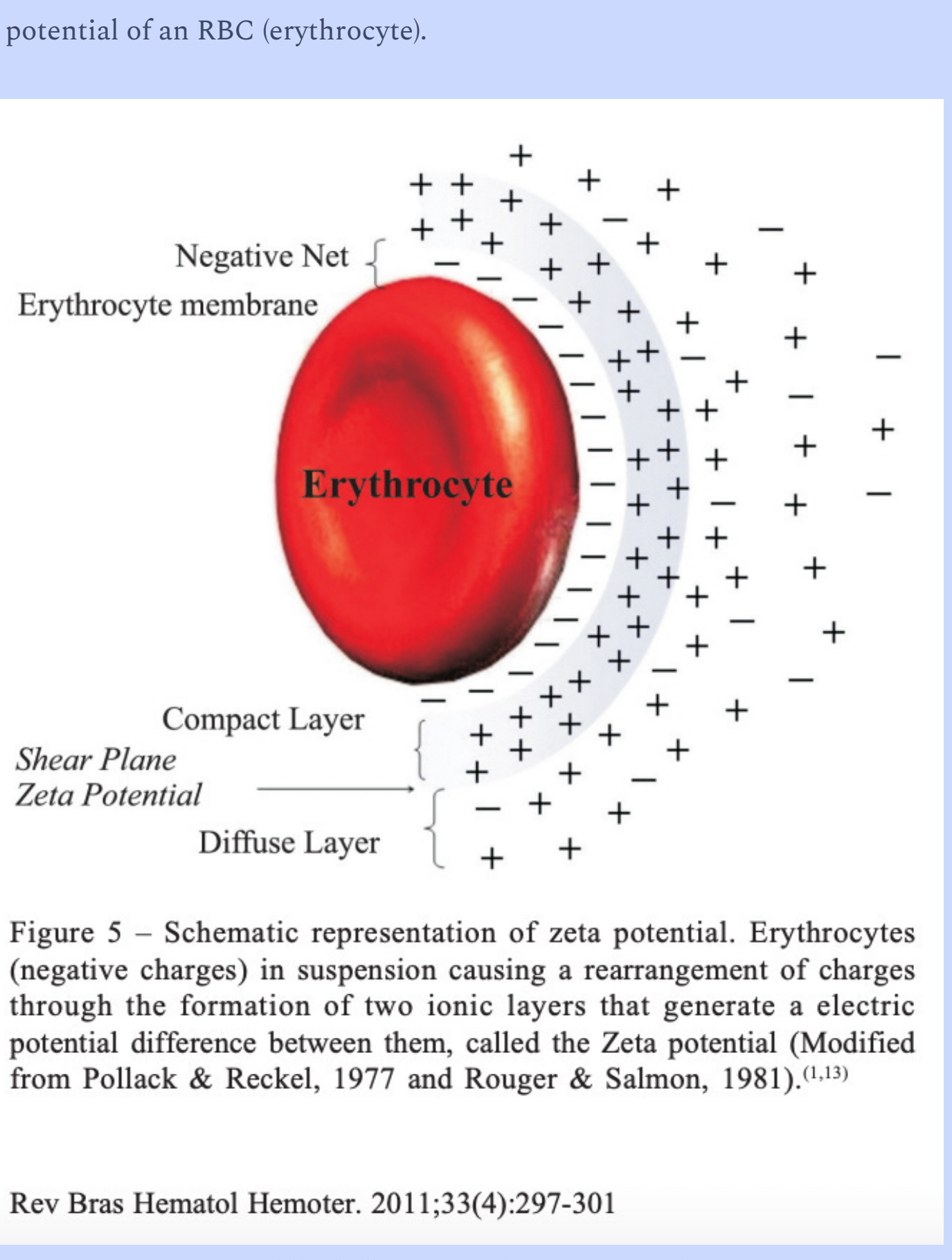


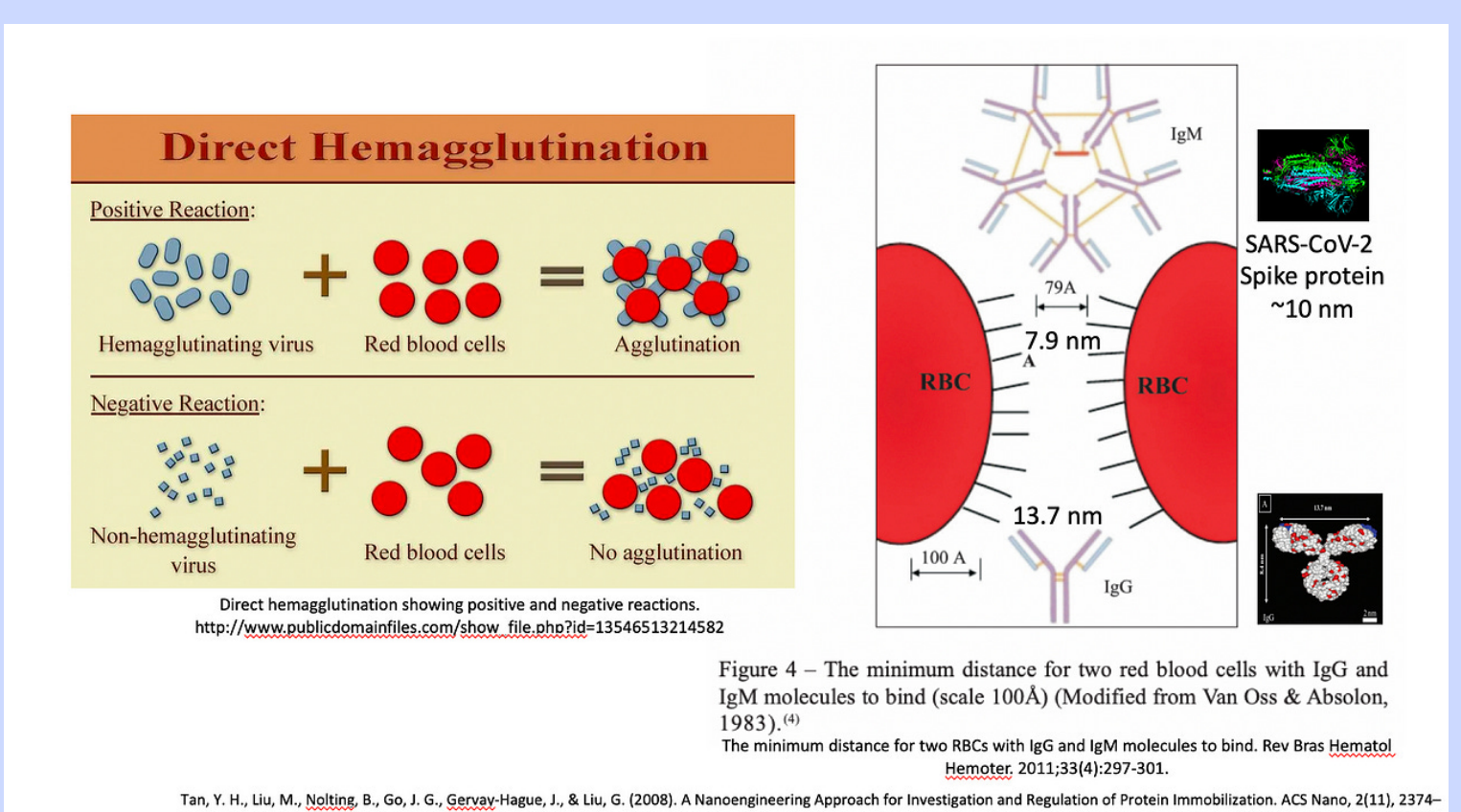
Figure 5 – Schematic representation of zeta potential. Erythrocytes (negative charges) in suspension causing a rearrangement of charges through the formation of two ionic layers that generate a electric potential difference between them, called the Zeta potential (Modified from Pollack & Reckel, 1977 and Rouger & Salmon, 1981).(1,13)

Rev Bras Hematol Hemoter. 2011;33(4):297-301

Figure 7: Red blood cell zeta potential. Rev Bras Hematol Hemoter. 2011;33(4):297-301.

The magnitude of the zeta potential depends on the net charge density of surrounding cations, that is, on the ionic strength. Thus, a decrease in ionic strength will result in a reduction in the thickness of the double layer due to increased cations density resulting in the need to maintain electrical neutrality. This further reduces the zeta potential. (See reference #6)

Interjection: Look at the following schematics and think about zeta potential in the context of direct hemagglutination by a virus that induces hemagglutination. The antibodies that normally glue the RBCs can be replaced by viruses (or viral bits) themselves in some cases. In the schematic on the right of Figure 8, it is shown that the gap between 2 RBCs that is bridged by an IgG or IgM antibody is 79 angstroms (Å). For perspective, that is 7.9 nanometers (nm). The SARS-CoV virus is ~100 nm on average and the spike protein alone is ~10 nm (length) [20]. An IgG antibody is ~13.7 nm wide [21] so it seems, at least size-wise, that it's a good fit for the spike protein in terms of bindability. What about the spike's charge? The RBD of the spike protein is positively charged and more positively charged according to variant, ie: Omicron's RBD is more strongly positive with regard to net electrostatic surface charge, relative to the original chicken Wuhan recipe RBD. [22]



Direct hemagglutination showing positive and negative reactions. http://www.publicdomainfiles.com/show_file.php?id=13546513214582

Figure 4 – The minimum distance for two red blood cells with IgG and IgM molecules to bind (scale 100Å) (Modified from Van Oss & Absolon, 1983).(4)

The minimum distance for two RBCs with IgG and IgM molecules to bind. Rev Bras Hematol Hemoter. 2011;33(4):297-301.

Tan, Y. H., Liu, M., Nolting, B., Go, J. G., Gervay-Hague, J., & Liu, G. (2008). A Nanoengineering Approach for Investigation and Regulation of Protein Immobilization. ACS Nano, 2(11), 2374–2384. doi:10.1021/nn800508f

Figure 8: Direct agglutination and minimum binding distances between 2 RBCs.

It seems really easy to imagine that the top end of spike protein that houses the RBD can bind a couple of RBCs.

What interviral/interspike-RBC forces would have to be overcome in order for spike to bind those sialic acids? Hydrophobic bonds, Van der Walls and electrostatic forces and hydrogen bonds all come to mind, in addition to repulsive electric forces such as the zeta potential. That's a lot of forces!

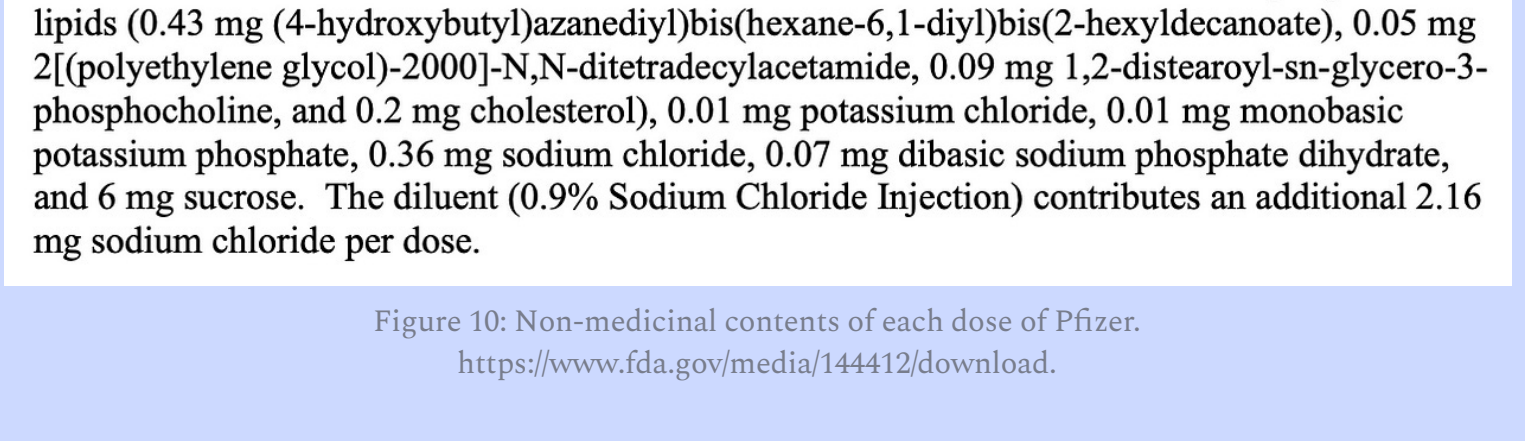
Keep these forces in mind and let's return to pH, ionic strength, osmotic pressure and temperature, which are all inherently intertwined with the above mentioned forces and bonds. Assuming that one of these parameters underwent a small change, then potentially, one of the effects on the zeta potential values of the RBCs, would be their reduction. If the zeta potential was reduced, then the RBCs could aggregate. In my research, I found four things that can reduce the zeta potential of RBCs by decreasing the ionic strength of the medium:

1. **Albumin**
2. **LISS** (Low ionic strength solution)
3. **Proteolytic Enzyme**
4. **PEG** (Polyethylene Glycol) (See reference #6)

> Physiochemical properties such as particle size and zeta potentials can be simply manipulated and controlled by varying the key processing parameters such as CS, PEG concentration and CS/TPP mass ratio. [23]

PEG is one of four constituent lipids in the lipid nanoparticle formulations used by Moderna and Pfizer for the delivery of mRNA in the COVID-19 injectable products. "Polyethylene Glycol causes dehydration of cells and potentiates agglutination." [24] The way in which PEG potentiates agglutination of RBCs (I think) is by removing water molecules from the sialic acids to free up the sites for hemagglutinin binding, subsequently improving agglutination ability. (I might have this completely wrong, but from what I understand, this is the mechanism of action.) The net effect will be a reduction in electrostatic potential.

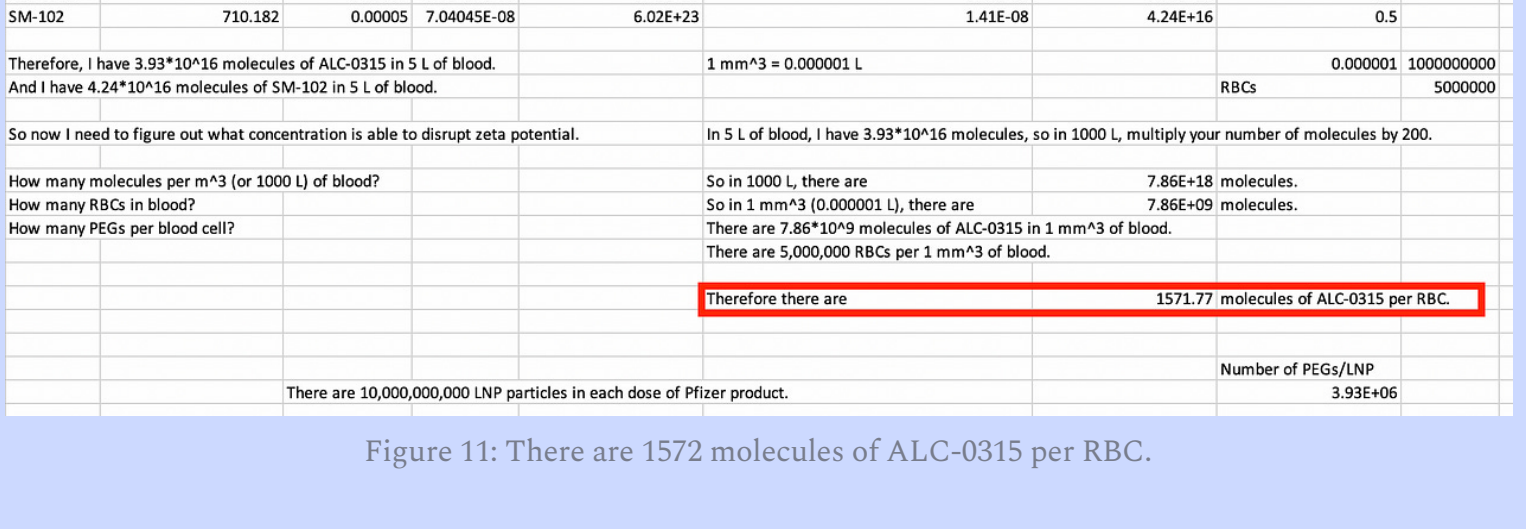
The final diluted injectable dose of 0.3 ml of the COVID-19 injectable products contains the following ingredients listed in Figure 10, including 30 mcg of a nucleoside modified messenger RNA (modRNA) encoding the viral spike (S) glycoprotein of SARS-CoV-2 and 0.05 mg 2[(polyethylene glycol)-2000]-N,N-ditetradecylacetamide.



Each dose of the Pfizer-BioNTech COVID-19 Vaccine also includes the following ingredients: lipids (0.43 mg (4-hydroxybutyl)azanediyl)bis(hexane-6,1-diyl)bis(2-hexyldecanoate), 0.05 mg 2[(polyethylene glycol)-2000]-N,N-ditetradecylacetamide, 0.09 mg 1,2-distearoyl-sn-glycero-3-phosphocholine, and 0.2 mg cholesterol), 0.01 mg potassium chloride, 0.01 mg monobasic potassium phosphate, 0.36 mg sodium chloride, 0.07 mg dibasic sodium phosphate dihydrate, and 6 mg sucrose. The diluent (0.9% Sodium Chloride Injection) contributes an additional 2.16 mg sodium chloride per dose.

Figure 10: Non-medicinal contents of each dose of Pfizer. https://www.fda.gov/media/144412/download.

Is the 0.05 mg PEG in a 0.3 ml Pfizer injection enough to lower RBC zeta potential and potentially induce agglutination of RBCs? [25] We can do some calculating to make an educated guess as to the ratio of PEG molecules per RBC, and then determine if this ratio is enough to disrupt the zeta potential of the RBC to potentiate agglutination. (See Figure 11 for my calculations.) Assuming homogenous distribution of PEG molecules in the blood, we get a ratio of 1,572:1 PEG molecules to RBCs since there are 5,000,000 RBCs in 1 cubic millimeter of blood. [26] Assuming a concentration of molecules at the injection site, for example, this ratio would be even higher.



	MOLAR MASS (g/mol))	mass_per_injecti	n (mol)	AvoC		Molarity (concentration) - g/L		N (mol)		volume of injection (ml)	per 5 L blood
ALC-0315	766.29	0.00005	6.52494E-08		6.02E+23		1.30E-08		3.93E+16	0.3	
SM-102	710.182	0.00005	7.04045E-08		6.02E+23		1.41E-08		4.24E+16	0.5	

Therefore, I have 3.93*10^16 molecules of ALC-0315 in 5 L of blood.
And I have 4.24*10^16 molecules of SM-102 in 5 L of blood.
1 mm^3 = 0.000001 L
0.000001 1000000000
RBCs 5000000
So now I need to figure out what concentration is able to disrupt zeta potential.
In 5 L of blood, I have 3.93*10^16 molecules, so in 1000 L, multiply your number of molecules by 200.
How many molecules per m^3 (or 1000 L) of blood?
How many RBCs in blood?
How many PEGs per blood cell?
So in 1000 L, there are 7.86E+18 molecules.
So in 1 mm^3 (0.000001 L), there are 7.86E+09 molecules.
There are 7.86*10^9 molecules of ALC-0315 in 1 mm^3 of blood.
There are 5,000,000 RBCs per 1 mm^3 of blood.
Therefore there are 1571.77 molecules of ALC-0315 per RBC.
Number of PEGs/LNP
3.93E+06
There are 10,000,000,000 LNP particles in each dose of Pfizer product.

Figure 11: There are 1572 molecules of ALC-0315 per RBC.

I haven't located a paper that confirms the ratio of PEG:RBCs that can lower the zeta potential of RBCs to induce hemagglutination yet - I will update the article when I find it. Reference #19 paper is good, but reports changes to zeta potentials of the LNPs themselves, not RBCs. For now, my gut tells me this is enough PEG to disrupt the zeta potential of RBCs. This idea also lends itself to the hypothesis that aspiration during injection is a determinant of adverse event frequency. The reason I say this is because if there is, in fact, enough PEG in the blood - assuming no aspiration and subsequent injection of product into the blood stream via a vessel - to lower the zeta potential of RBCs to cause them to clump, then we would only see a fraction of injected people suffering agglutination of their RBCs, ie: the fraction that got this stuff injected directly to the blood. And this is what we are seeing. I would also imagine that repeated doses of the PEG-coated LNP capsules would probably exacerbate any RBC agglutination that had already ensued.

What effects do the other ingredients (there are a lot of salts, for example) have on the ionic strength in the blood medium in general? I would say, negligible effects, and certainly less than those determined by simple daily food and water ingestion. Food and water have far greater effects on ionic strength of blood - more than an injection with salts ever could, in my opinion. I mean, unless there was something really insidious in the injection, like a host-assisted/self-amplifying protein that glued RBCs together.

Back to the title question

Are red blood cells agglutinating in injected people because of zeta potential disruption?

Zeta potential disruption would need to occur in order for the spike to bind sialic-acid tipped glycans on RBCs in the first place, so again, the more pertinent question is: are other factors, like PEG, involved that potentiate agglutination by lowering the zeta potential of RBCs? I believe quantitative experiments to determine the effects of various PEG, salt and sugar concentrations and temperature changes for example, need to be done to define this physicochemical binding. It is possible that people suffering the worst thrombotic effects following injection simply have 'gummier' blood to begin with based on the ionic strength of their blood (alkaline water can also help to lower blood viscosity). [27]

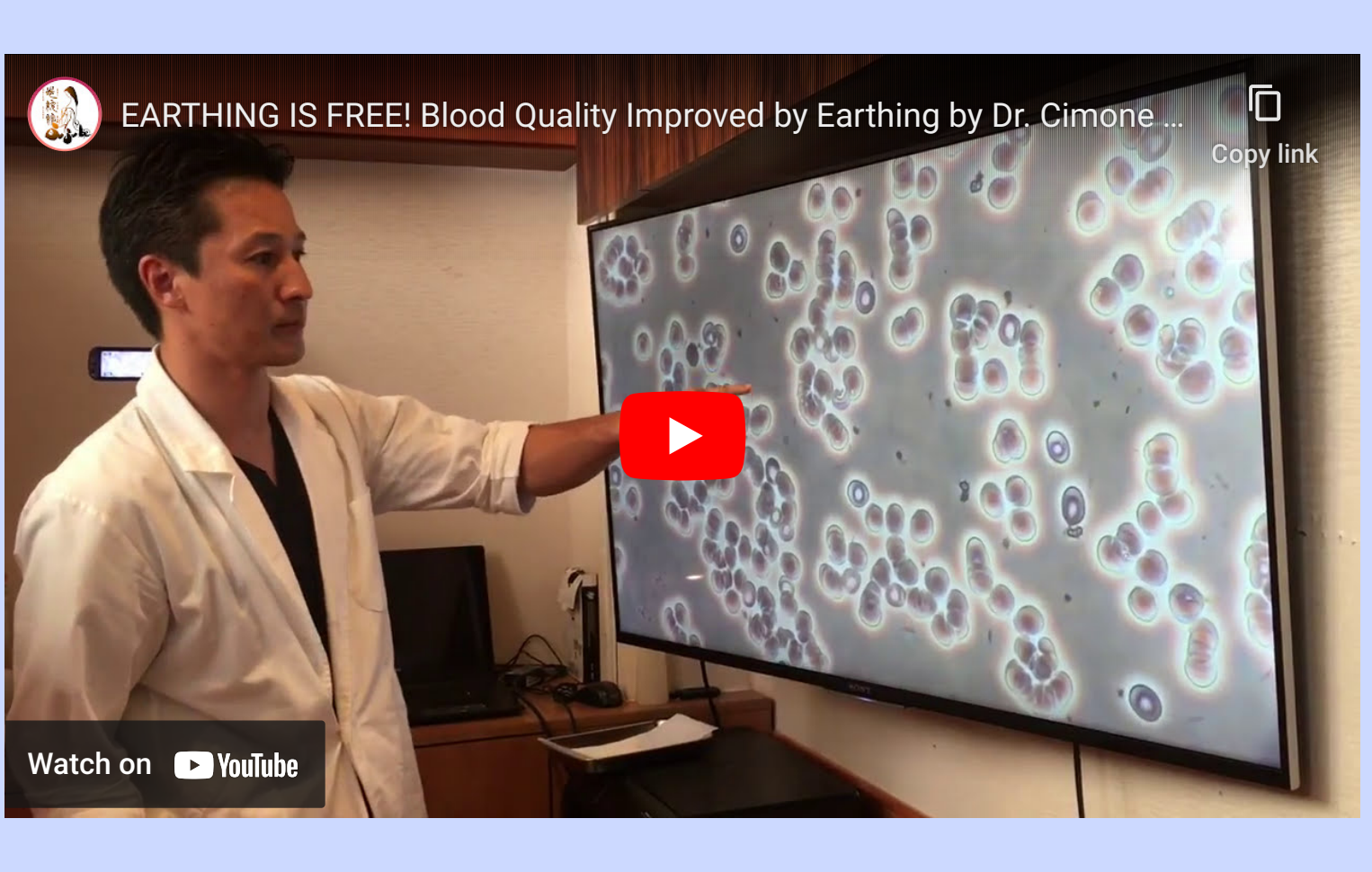
There are so many questions that need answering. Thrombotic adverse events associated with these shots are off the charts (N = 51,600 w/URF -> 1,599,600; total shot administration number: 673,181,220 [28] = 1/420 people). Agglutination of RBCs, equating to sticky or clumpy blood, seems to be a much more prevalent clinical pathology since 2021. I can't imagine why. It is highly likely, that the blood-clotting-related adverse events being reported to every pharmacovigilance database in the world could be explained by spike-mediated hemagglutination (and apparently, curcumin prevents it [29]).

The combined effects of the highly (N-)glycosylated spike protein [30] acting as RBC fly tape, and the changes in ionic charge or balance of the blood due to potential changes in blood chemistry induced by a multitude of factors like electrolyte levels, could certainly enhance hemagglutination. Add PEG to the mix, and this might exacerbate hemagglutination by lowering RBC zeta potential.

P.S. Cationic lipids have high zeta potentials. (See reference #19.) So I wonder what effect the introduction of lipids with high zeta potentials has on RBCs?

Oh, and I don't mean to mess with your minds, but magnets also affect zeta potential. You can read about that in an article entitled: "Magnetic Effects on Zeta Potential and Diffusivity of Nonmagnetic Colloidal Particles". [31]

In addition to an alkaline diet and daily turmeric, try *grounding* every day as part of a healthy lifestyle - that includes free flowing non-sticky blood. :)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1 Stratton, F., Rawlinson, V. I., Gunson, H. H., & Phillips, P. K. (1973). *The Role of Zeta Potential in Rh Agglutination. Vox Sanguinis, 24(3), 273–279.* doi:10.1111/j.1423-0410.1973.tb02641.x

2 Scheim, D.E. A Deadly Embrace: Hemagglutination Mediated by SARS-CoV-2 Spike Protein at Its 22 N-Glycosylation Sites, Red Blood Cell Surface Sialoglycoproteins, and Antibody. Int. J. Mol. Sci. 2022, 23, 2558. https:// doi.org/10.3390/ijms23052558.

3 Zeng, Q., Langereis, M. A., van Vliet, A. L. W., Huizinga, E. G., & de Groot, R. J. (2008). Structure of coronavirus hemagglutinin-esterase offers insight into corona and influenza virus evolution. Proceedings of the National Academy of Sciences, 105(26), 9065–9069. doi:10.1073/pnas.0800502105.

4 https://www.etymonline.com/search?q=agglutination

5 https://www.etymonline.com/word/hemo-?ref=etymonline_crossreference

6 Fernandes HP, Cesar CL, Barjas-Castro Mde L. Electrical properties of the red blood cell membrane and immunohematological investigation. Rev Bras Hematol Hemoter. 2011;33(4):297-301. doi: 10.5581/1516-8484.20110080. PMID: 23049321; PMCID: PMC3415751.

7 Briody B.A. Jr. Hemagglutination induced by viruses. Yale J Biol Med. 1946 Oct;19(1):29-61. PMID: 20275721; PMCID: PMC2602042.

8 Shida H. Vaccinia virus hemagglutinin. Subcell Biochem. 1989;15:405-40. doi: 10.1007/978-1-4899-1675-4_12. PMID: 2678619.

9 Ishikawa Y, Urano-Tashiro Y, Yamanaka Y, Saiki K, Hayashida N, Takahashi Y. Hemagglutinating properties of a Streptococcus gordonii strain expressing sialic acid-binding adhesin homolog with low binding site similarity to that of strain DL1. J Oral Biosci. 2022 Jun;64(2):253-258. doi: 10.1016/j.job.2022.03.001. Epub 2022 Mar 11. PMID: 35288286.

10 Manzanares-Meza LD, Medina-Contreras O. SARS-CoV-2 and influenza: a comparative

overview and treatment implications. Bol Med Hosp Infant Mex. 2020;77(5):262-273. English. doi: 10.24875/BMHIM.20000183. PMID: 33064680.

11. https://www.research.colostate.edu/wp-content/uploads/2018/11/ZetaPotential-Introduction-in-30min-Malvern.pdf
12. https://nanocomposix.com/pages/zeta-potential-measurements
13. https://www.labce.com/spg813211_zeta_potential_and_van_der_waals_forces.aspx
14. https://medicallabtechnology.com/negative-zeta-potential-red-blood-cells/
15. Durocher JR, Payne RC, Conrad ME. Role of sialic acid in erythrocyte survival. Blood. 1975 Jan;45(1):11-20. PMID: 803103.
16. Kahane, I., Polliack, A., Rachmilewitz, E. *et al.* Distribution of sialic acids on the red blood cell membrane in β thalassaemia. *Nature* **271**, 674–675 (1978). https://doi.org/10.1038/271674a0.
17. https://www.ludger.com/glycan-analysis-services/sialic-acid-analysis.php
18. Sv. Jovtchev, N. Hristova, S. Stoeff, T. Galabova & S. Stoylov (2009) Investigations on the Polymer Induced Aggregation of Red Blood Cells, Biotechnology & Biotechnological Equipment, 23:sup1, 581-584, DOI: 10.1080/13102818.2009.10818492.
19. Smith, M. C., Crist, R. M., Clogston, J. D., & McNeil, S. E. (2017). Zeta potential: a case study of cationic, anionic, and neutral liposomes. Analytical and Bioanalytical Chemistry, 409(24), 5779–5787. doi:10.1007/s00216-017-0527-z.
20. Yinon M Bar-On, Avi Flamholz, Rob Phillips, Ron Milo. (2020). Science Forum: SARS-CoV-2 (COVID-19) by the numbers. eLife 9:e57309.
21. Tan, Y. H., Liu, M., Nolting, B., Go, J. G., Gervay-Hague, J., & Liu, G. (2008). *A* Nanoengineering Approach for Investigation and Regulation of Protein Immobilization. ACS Nano, 2(11), 2374–2384. doi:10.1021/nn800508f.
22. Gan Hin Hark, Zinno John, Piano Fabio, Gunsalus Kristin C. Omicron Spike Protein Has a Positive Electrostatic Surface That Promotes ACE2 Recognition and Antibody Escape. Frontiers in Virology. Volume 2, 2022. 10.3389/fviro.2022.894531.
23. Shah, Sunil & Pal, Angshuman & Kaushik, V. & Devi, Surekha. (2009). Preparation and Characterization of Venlafaxine Hydrochloride-Loaded Chitosan Nanoparticles and In Vitro Release of Drug. Journal of Applied Polymer Science. 112. 2876 - 2887. 10.1002/app.29807.
24. https://medicallabtechnology.com/negative-zeta-potential-red-blood-cells/
25. https://www.fda.gov/media/144412/download
26. Sharma R, Sharma S. Physiology, Blood Volume. 2022 Apr 14. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan–. PMID: 30252333.
27. https://premiumwaters.com/blog/alkaline-electrolyte-water-difference/
28. https://covid.cdc.gov/covid-data-tracker/#vaccinations_vacc-people-booster-percent-pop5
29. https://professional.diabetes.org/abstract/curcumin-prevents-glycosylation-proteins-and-oxidative-stress-human-red-blood-cells-rbc
30. Sanda M, Morrison L, Goldman R. N- and O-Glycosylation of the SARS-CoV-2 Spike Protein. Anal Chem. 2021 Feb 2;93(4):2003-2009. doi: 10.1021/acs.analchem.0c03173. Epub 2021 Jan 6. PMID: 33406838; PMCID: PMC7805595.
31. Higashitani, K., Iseri, H., Okuhara, K., Kage, A., & Hatade, S. (1995). Magnetic Effects on Zeta Potential and Diffusivity of Nonmagnetic Colloidal Particles. Journal of Colloid and Interface Science, 172(2), 383–388. doi:10.1006/jcis.1995.1268.

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Jennifer Depew, R.D. Writes deNutrients - News to Use3 hr ago ♥ Liked by Jessica Rose

Related info: "Inhibition of spike protein-induced HA was tested using the macrocyclic lactone ivermectin (IVM), which is indicated to bind strongly to SARS-CoV-2 spike protein glycan sites. The results of these experiments were, first, that spike protein from these four lineages of SARS-CoV-2 induced HA. Omicron induced HA at a significantly lower threshold concentration of spike protein than for the three prior lineages and was much more electropositive on its central spike protein region. IVM blocked HA when added to RBCs prior to spike protein and reversed HA when added afterwards. These results validate and extend prior findings on the role of glycan bindings of viral spike protein in COVID-19." (Boschi, et al, 2022, preprint) SARS-CoV-2 Spike Protein Induces Hemagglutination: Implications for COVID-19 Morbidities and Therapeutics and for Vaccine Adverse Effects, https://www.biorxiv.org/content/10.1101/2022.11.24.517882v1

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2 replies

PamelaDrewWrites Pamela Drew #my2c3 hr ago·*edited 3 hr ago* ♥ Liked by Jessica Rose

Love the analogies they are super helpful.. yesterday Del Bigtree & Ryan Cole took a tour of the lab and did slides with Dell's blood and jab contents. The reaction of the blood to one drop of Pfizer looks very much like what you describe here. Starts @ 60 min https://thehighwire.com/watch/

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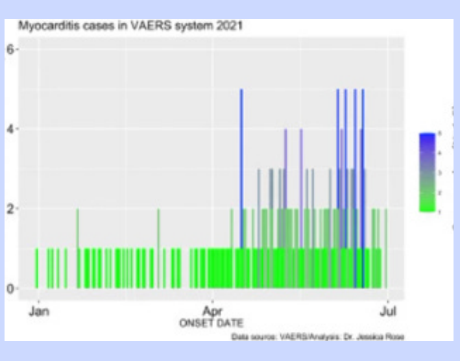
This is one of the emails I received the other day. I get hundreds daily, and I am hearing you all.

This particular note spoke loudly to me and this lovely person gave me permission to share her words.

JESSICA ROSEJUL 17 ♡1,614 230



A Report on Myocarditis Adverse Events in the U.S. Vaccine Adverse Events Reporting System (VAERS) in Association with COVID-19 Injectable...

Jessica Rose PhD, MSc, BSc and Peter A. McCullough MD, MPH

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Rewrite: Let's tag team this until everybody understands

The modified spike protein is dangerous and for very specific reasons.

JESSICA ROSEJUN 13 ♡667 141

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